عنوان مقاله:

Inclusion Removal Mechanisms of Al-Killed ۳۰۴ Low Carbon Stainless Steel Melt Using Hercynite Coated Al۲O۳-C Ceramic Foam Filters

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خلاصه مقاله:

Carbon bonded alumina foam filters have been successfully using for steel melt filtration. Enhancement of the filtration capacity of Al۲O۳-C foam filters is a key factor in order to make them applicable to be used for large steel casting parts or continuous casting of steel. In the present study, filtration performance of hercynite coated carbon bonded alumina foam filters containing ۱ Wt.% of nano-TiO۲ were evaluated by the exposure to an Al-killed ۳۰۴ low carbon stainless steel melt. Successful impingement of steel melt into the filters revealed the filter structure strength and effectiveness under casting temperature and molten metal exposure conditions. Microstructural investigations using a field emission scanning electron microscope (FESEM) equipped with energy dispersive X-ray spectroscopy (EDS) analysis of the active hercynite coated filter surfaces after steel melt filtration revealed the entrapment of the oxide inclusions from the steel melt on the surface of the filter. In addition, filtration mechanisms for whiskers and dendritic Al۲O۳, and hercynite inclusions at different Al/oxygen activity conditions of the steel melt were proposed. To this end, the feasible potential for the application of hercynite coated Al۲O۳-C filters for low and ultra-low carbon steel casting processes could be promising.

کلمات کلیدی:

Al۲O۳-C foam filters, Alumina, Refractories, Steel filtration, Carbon